STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY

DEQ

NONFERROUS METALLIC MINERAL MINING PERMIT
Part 632, Nonferrous Metallic Mineral Mining, 1994 PA 451

Permit Number: **MP 01 2016** Date Issued: **December 28, 2016**

Issued to:

Aquila Resources Inc.
E807 Gerue Street
Stephenson, MI 49887

For the:

Back Forty Project

Location of Mine:

T35N, R29W and T35N, R28W; Lake Township, Menominee County, Michigan

The Michigan Department of Environmental Quality (MDEQ) hereby issues this Nonferrous Metallic Mineral Mining Permit (Mining Permit) to conduct nonferrous metallic mineral mining operations to Aquila Resources Inc. for the Back Forty Project. This Mining Permit is issued under the provisions of Part 632, Nonferrous Metallic Mineral Mining, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA).

The terms and conditions that are set forth in the Application for a Mining Permit (Permit Application) submitted by Aquila Resources Inc. for the Back Forty Project, including all supplemental documents amending, clarifying, or revising the initial submittal of the Permit Application, and including the mining, reclamation, and environmental protection plan, are incorporated in and become a part of this Mining Permit. This Mining Permit also incorporates the attached General Permit Conditions and Special Permit Conditions.

Harold R. Fitch
Michigan Department of Environmental Quality

Dec. 28, 2016
Date

GENERAL PERMIT CONDITIONS
NONFERROUS METALLIC MINERAL MINING PERMIT NO. MP 01-2016
AQUILA RESOURCES INC. – BACK FORTY PROJECT
PART 632, 1994 P.A. 451

A. Definitions

1. As used in this Mining Permit:
   a. "Section 324.632XX" refers to a section of Part 632, 1994 PA 451 of the Michigan Compiled Laws.
   b. "R XXX.XXX" refers to a rule under the Michigan Administrative Code.
   c. "MDEQ" means the Michigan Department of Environmental Quality.
   d. "MDNR" means the Michigan Department of Natural Resources.
   e. "MDOT" means the Michigan Department of Transportation.
   f. "OOGM" means the Office of Oil, Gas, and Minerals.
   g. "MSHA" means the FEDERAL Mining Safety and Health Administration.
   h. "Person" means an individual, partnership, corporation, association, governmental entity, or other legal entity.
   i. "Emergency Management Coordinator" means that term as defined in Section 2 of the Emergency Management Act, 1976 PA 390, MCL 30.402.

B. Authorizations

1. The permittee shall not engage in the mining of nonferrous metallic minerals, as defined in R 425.102(1)(e), at the Back Forty Project except as authorized by this Mining Permit.
2. This Mining Permit is not effective until all other permits required under the NREPA for the Back Forty Project are obtained. The permittee shall comply with all other applicable permit standards under the NREPA.
3. This Mining Permit will remain in effect until terminated or revoked by the MDEQ. The MDEQ may terminate this Mining Permit under the conditions specified in Section 324.63207(2). The MDEQ may revoke this Mining Permit under the conditions specified in Section 324.63207(3).
4. Compliance with the provisions of this Mining Permit or of Part 632 of the NREPA does not relieve the permittee of the obligation to comply with all other applicable tribal, state, federal, or local statutes, regulations, or ordinances.
5. This Mining Permit does not establish or convey property rights in either real estate or material.

C. Transfer or Amendment of Permit

1. The MDEQ may transfer this Mining Permit to another person after public notice as follows:
   a. The person acquiring this Mining Permit shall submit to the MDEQ a request for transfer of this Mining Permit and shall provide the financial assurance required under Section 324.63211.
   b. The person acquiring this Mining Permit shall accept the General Conditions and Special Conditions of this Mining Permit and shall adhere to the requirements set forth in Part 632 of the NREPA.
   c. If the existing permittee is determined by the MDEQ to be in violation of Part 632 of the NREPA, or the rules promulgated thereunder, at the Back Forty Project, then this Mining Permit will not be transferred until the existing permittee has completed the necessary corrective actions or the person acquiring this Mining Permit has entered into a written consent agreement with the MDEQ to correct all of the violations.

   Pending the transfer of this Mining Permit, the proposed transferee shall not operate the Back Forty Project.
2. The MDEQ will not transfer this Mining Permit to another person if the MDEQ has determined that person to be in violation of Part 632 of the NREPA, rules promulgated thereunder, this Mining Permit, or an order of the MDEQ under Part 632 of the NREPA, unless the person has corrected the violation or the person has agreed in writing to correct the violation pursuant to a compliance schedule approved by the MDEQ.
3. A request to transfer this Mining Permit to another person shall include the following:
   a. An update of the contingency plan.
   b. Provisions for financial assurance as prescribed in R 425.301.
   c. An organization report for the acquiring operator.

   A transfer of this Mining Permit is not effective until all other applicable permits are transferred to the acquiring operator.
4. If the permittee conveys his or her authority to operate the Back Forty Project to another person, and the MDEQ has not approved a request for transfer of this Mining Permit, then, in addition to other enforcement actions, the MDEQ may order the immediate suspension of any or all mining activities at the Back Forty Project, including the removal or sale of metallic product.
5. This Mining Permit may be amended subject to the requirements of Section 324.63207(6) and R 425.206. An application for amendment shall include revisions of any of the following that are affected by the changes:
   a. The Environmental Impact Assessment.
   b. The Mining, Reclamation, and Environmental Protection Plan.
   c. The Contingency Plan.
   d. Federal, state, and local permits and licenses that are anticipated to be required.
   e. Provisions for financial assurance required under R 425.301.
   f. Other terms and conditions of this Mining Permit.

D. Financial Assurance

1. The permittee shall maintain financial assurance during mining operations until all reclamation has been completed and approved by the MDEQ, and throughout the postclosure monitoring period, as prescribed under Section 324.63211 and R 425.301; or until the MDEQ releases financial assurance at such time as this Mining Permit may be terminated under Section 324.63207(2)(a). Failure to maintain financial assurance as required constitutes grounds for the MDEQ to order immediate suspension of activities at the Back Forty Project, pursuant to Section 324.63221.
2. The MDEQ may provide a partial release of financial assurance for those portions of the site that are reclaimed and have met the criteria for release under Section 324.63211(2) and R 425.301(2), based upon an update of financial assurance as described in Section 324.63211(2) and R 425.308.

E. Records, Reports, and Notifications

1. The permittee shall provide written notice to the OOGM Upper Peninsula District Geologist, of the date mining will commence at least 30 days prior to mining activities.
2. The permittee shall file with the OOGM Upper Peninsula District Geologist a Mining and Reclamation Report on or before March 15 of each year, both during mine operations and post closure monitoring, as required by Section 324.63213 and R 425.501. The report shall include a description of the status of mining and reclamation operations, an update of the contingency plan, monitoring results from preceding calendar year, tonnage totals of mined material, and amount of metallic product by weight. The report shall be filed in printed and electronic format. The permittee shall file a copy of the report with the Lake Township Supervisor.
3. The permittee shall provide a copy of the annual update of the contingency plan to the local emergency management coordinator at the time it is filed with the MDEQ.
4. In addition to the annual update of the contingency plan filed with the mining and reclamation report, the permittee shall promptly provide an update of the contingency plan to the MDEQ and local emergency management coordinator whenever there is a change of the notification process, change of local representatives of the permittee, substantial change in site conditions, or substantial change of equipment noted on the plan.
5. Records upon which the annual Mining and Reclamation Reports are based shall be preserved by the permittee for three years and made available to the MDEQ upon request.
6. The permittee shall file with the OOGM Upper Peninsula District Geologist an updated estimate of the cost of reclamation for mining activities for the current and succeeding 2 years of operation of the mine on or before March 15 of every third year after issuance of this Mining Permit, or as the MDEQ determines to be necessary.

7. The permittee shall promptly notify the OOGM Upper Peninsula District Geologist and each emergency management coordinator having jurisdiction over the affected area of any incident, act of nature, or exceedance of a Part 632 permit standard or condition at the Back Forty Project that has created, or may create, a threat to the environment, natural resources, or public health and safety. The notification shall be made as soon as possible by telephone or in person to the OOGM Upper Peninsula District Geologist during normal business hours or to the MDEQ Pollution Emergency Alerting System (PEAS) between 5:00 p.m. and 8:00 a.m. and on weekends and holidays.
8. The permittee shall submit to the OOGM Upper Peninsula District Geologist a detailed written incident report giving the particulars of the incident, act of nature, or exceedance of a Part 632 permit standard or condition within 10 days of discovery. If the response to the incident, act of nature, or exceedance is not concluded at the time this incidence report is filed as required, then the permittee shall submit to the OOGM Upper Peninsula District Geologist a written final incident report within 30 days after the incident response is concluded. The permittee shall preserve records upon which incident reports are based for three years or until the end of the postclosure monitoring period, whichever is later.
9. If the permittee ceases all mining activities for a period of 90 days or more, the permittee shall submit written notice to the OOGM Upper Peninsula District Geologist of the date mining activities will resume at least 30 days before resumption of mining activities.
10. The permittee shall file an updated Organization Report, as defined in Rule R 425.103(c), within 30 days after any significant changes in the permittee's corporate organization.

F. Annual Nonferrous Metallic Mineral Surveillance Fee

1. The permittee shall pay the annual Nonferrous Metallic Mineral Surveillance Fee assessed by the MDEQ pursuant to Section 324.63215, and any penalties that may be assessed if the fee is not paid when due.

G. Access by MDEQ

1. Authorized representatives of the MDEQ may enter at all reasonable times in or upon the Back Forty Project site for the purpose of inspecting and investigating conditions relating to the operation of the mine and associated facilities.

SPECIAL PERMIT CONDITIONS

NONFERROUS METALLIC MINERAL MINING PERMIT NO. MP 01 2016
AQUILA RESOURCES INC. – BACK FORTY PROJECT
PART 632, 1994 PA 451

A. General

1. The MDEQ may modify or amend these Special Permit Conditions, or impose additional permit conditions, if necessary and as provided under Part 632 of the NREPA, during the life of mine.
2. The permittee shall immediately suspend relevant mining activities, and shall promptly notify the OOGM Upper Peninsula District Geologist, in the event that any materials of possible archaeological, historic, or cultural value are unearthed by mining activities, and the permittee shall implement the Unanticipated Discovery Plan. If a qualified archaeologist determines that materials discovered are in fact cultural, the permittee shall notify the State Archeologist. In the event that pre-contact cultural materials are discovered, the permittee or the State Archaeologist will notify appropriate tribal groups.
3. If work must proceed near the area of an unanticipated discovery of cultural resources or human remains before the disposition of the discovery is final, care must be taken to avoid disturbing the area in which the discovery was made. Further, the activity shall be monitored by a qualified archaeologist until the disposition of the discovery is resolved.
4. If mining operations are suspended at the Back Forty Project for a continuous period exceeding 90 days, the permittee shall take actions to maintain, monitor, and secure the mining area and shall conduct any interim sloping or stabilizing of surfaces necessary to protect the environment, natural resources, or public health and safety in accordance with this Mining Permit.
5. The permittee shall utilize fencing, gates, or other measures to safeguard the public from unauthorized entry into the mining area. The permittee shall post safety signs in conspicuous places around the site of any potential hazards to life or property. Fencing shall be constructed to restrict access by deer and other large mammals.
6. The permittee shall maintain fences and gates in a manner that preserves their intended purpose.

B. Other Permits and Requirements

1. The permittee shall operate the Back Forty Project in conformance with all applicable NREPA permits: Michigan Air Use Permit – Permit to Install, National Pollutant Discharge Elimination System (NPDES) Permit, Wetland Permit, Notice of Coverage for storm water management during construction activities, and Notice of Intent for storm water management during operations.
2. The permittee shall file annual reports in compliance with the Federal Emergency Planning and Community Right to Know Act during operation of the Back Forty Project.

3. The permittee shall prepare and implement a Spill Prevention Control and Countermeasures (SPCC) Plan for the fuel storage area that conforms to 40 CFR 112. The SPCC Plan shall comply with the Part 5 rules promulgated pursuant to Part 31 of the NREPA.
4. The SPCC Plan shall be reviewed and certified by a Professional Engineer, and maintained at the mine facility. The permittee shall design, operate, and maintain all tanks and secondary containment to contain a worst-case spill.
5. The permittee shall design, operate, and maintain all aboveground storage tanks containing flammable or combustible materials in compliance with the Michigan Fire Prevention Code, 1941 PA 207.
6. The permittee shall prepare a Pollution Incident Prevention Plan (PIPP) to address potential spillage of fuel, salt, and other polluting materials in compliance with R 324.2001 through R 324.2009 at least 30 days prior to startup of the Wastewater Treatment Plant (WWTP) at the Back Forty Project. Within 30 days after its completion, the permittee shall notify the OOGM Upper Peninsula District Geologist and certify that the facility is in full compliance with R 324.2001 through R 324.2009, and shall notify the local emergency planning committee and the local health department. The permittee shall provide a copy of the PIPP to the MDEQ at their request.
7. The permittee shall review the PIPP every 3 years or after any release that requires implementation of the plan, whichever comes first. The permittee shall update the plan when facility personnel, processes, or procedures identified in the plan change or as otherwise necessary to maintain compliance with R 324.2001 through R 324.2009. Upon preparation of an updated plan, the permittee shall notify the MDEQ and recertify compliance with these rules.
8. The permittee shall minimize the potential for fuel spills and leaks through the following measures in a manner that is consistent with SPCC and PIPP requirements:
    a. Training of personnel responsible for hauling fuel in proper procedures and emergency response.
    b. Regular equipment inspections and documentation of findings.
    c. Adequate secondary containment around all above ground tanks.
    d. Staging of on-site emergency response equipment to quickly respond to unanticipated spills or leaks.
9. All fuel storage shall comply with applicable state and federal standards.
10. The permittee shall manage, treat, and discharge point source water associated with the mine operations in conformance with the NPDES Permit.
11. Prior to construction, a bat survey shall be conducted in the project area by a qualified biologist. The permittee shall submit the results of the survey to the OOGM Upper Peninsula District Geologist. The results of this survey shall be used to assess any potential impacts from mine construction or operations, and the permittee shall implement measures to mitigate those impacts.
12. The permittee shall obtain approval from the MDNR for any plan to relocate threatened/endangered species and species of special concern that exist in areas that will be disturbed.

C. Coverage

1. The Back Forty Project consists of four basic operations: open pit mine, beneficiation of ore, tailings disposal, and water treatment.
2. This Mining Permit governs construction, operation, closure, postclosure monitoring, reclamation, and any necessary remediation of the Back Forty Project pit, mill site, Tailings and Waste Rock Management Facility (TWRMF), and other project facilities. However, this Mining Permit shall not supersede or contravene any provisions on remediation in other applicable Parts of the NREPA.
3. Surface facilities consist of milling facilities; temporary storage for ore; water storage, treatment and discharge; tailings and waste rock storage and disposal; and other ancillary operations as outlined in the Mining Plan.
4. Unless approved by the MDEQ pursuant to an amendment to the permit, the permittee shall conduct mining operations in accordance with the approved Environmental Monitoring Plan for operations and postclosure, Mining Plan, Treatment and Containment Plan, Contingency Plan, and Reclamation Plan submitted in the Permit Application; and the tables, illustrations, figures, technical reports, calculations, and other data accompanying and supporting those documents.

D. Surface Facilities

1. During initial construction of the surface facilities, the permittee shall implement Best Management Practices for Soil Erosion and Sedimentation Control (SESC) as specified in the SESC Plan.
2. Excess soil from the site development and on-site road construction shall be stockpiled on site for use during reclamation. The permittee shall maintain topsoil and other soil stockpiles by replacing or repairing silt fences as needed; maintaining other soil erosion control structures and measures; repairing eroded areas including regrading and revegetating; and cleaning ditches where silt and/or sand has accumulated.
3. The permittee shall maintain all access roads and interior roads by minimizing mud tracking and removing mud as needed, and by promptly repairing ruts, potholes, or washouts, as weather permits.
4. The permittee shall control fugitive dust from traffic areas at the surface facility using methods consistent with the Air Use Permit for fugitive dust control plan. Unpaved areas will be surfaced and maintained with coarse aggregate material.
5. The permittee shall avoid direct impact to the following wetlands identified in the Environmental Impact Assessment during construction of surface facilities: WL40, WLA3, and WL2b.

E. Mining and Beneficiation

1. The permittee shall advise the MDEQ in advance of any significant planned departure from the schedule for construction and operation activities proposed in the Mining Plan.
2. This permit allows for only open pit mining methods at the Back Forty Project.
3. Coarse ore and concentrate stockpiles shall be maintained to prevent leachate from contaminating the environment.
4. All mill buildings shall be equipped with collection sumps to collect contact water. Contact water shall be used as facility process water, routed to the tailings discharge line, or treated in the WWTP.
5. Vehicles leaving the mine contact areas shall pass through the facility equipment wheel wash prior to entering non-contact areas.
6. All accumulated concentrate shall be removed from the outside of haul trucks prior to leaving the contact area.
7. All chemical reagents used for processing shall be stored in secure contained locations.
8. The tailings transport system to the TWRMF's shall have secondary containment. The tailings pipeline shall be contained in a lined continuous channel along the entire alignment of the pipelines to convey any leaks to geomembrane lined dump ponds, as specified in the Response to Michigan Department of Environmental Quality Comments dated May 9, 2016 on the Back Forty Project, June 2016 (Response, June 2016).
9. The tailings transport system shall be equipped with a leak detection system to monitor system breaches.
10. Prior to receipt of cyanide to the mining area, the permittee shall prepare a Cyanide Management Plan (CMP) that complies with applicable state and federal standards. The CMP shall include best management practices for transportation, handling, storage, optimization of cyanide usage, environmental protection and monitoring, spill prevention, safety, and emergency response. The CMP shall be reviewed and certified by a Professional Engineer to ensure that cyanide facilities are constructed according to accepted engineering standards and specifications, and shall be implemented as applicable. A copy of the CMP shall be provided to the MDEQ, and maintained on site during operations.
11. The Flotation TWRMF, Oxide TWRMF, and backfilled pit shall be amended with limestone as specified in the Response, June 2016. The MDEQ may approve modifications to the limestone amendment plan, including an alternative buffering material other than limestone, provided that the permittee demonstrates that pore water in the backfilled pit and leachate from the TWRMFs will be maintained at circumneutral pH. Modifications to the limestone amendment plan may be necessary as determined by facility water quality monitoring and/or data collected per Special Permit Condition E12.
12. The permittee shall conduct ongoing characterization of the geochemistry of the pit wall rocks, ore, waste rock, and tailings throughout construction and mining operations to calibrate and adjust the model and predictions of reactivity, and to

verify and further refine the process of amending the TWRMF's and backfilled pit with buffering material. Collection of data for this characterization shall include, but not be limited to, bench scale testing, field scale testing, and water quality monitoring. The results of this characterization shall be included in the Annual Mining and Reclamation Report.

F. Tailings and Waste Rock Management Facilities

1. The TWRMF shall be constructed with a leak detection liner system below the entire composite liner. The leak detection system shall consist of drainage layer and underlying high density polyethylene (HDPE) geomembrane liner and have a nominal thickness of 40 mils. The leak detection system shall be installed across the entire sub-base and tied to the leak detection sump, such that the TWRMF liner system performance can be assured.
2. The permittee may request an alternative design for leak detection to that specified in Special Permit Condition F1 for MDEQ consideration and approval. The proposed design must follow best industry practices and meet the intent of R 425.409 of Part 632.
3. Construction of the TWRMF shall not begin until the permittee has provided to the OOGM Upper Peninsula District Geologist revised engineering plans and specifications, and a Quality Assurance and Quality Control (QA/QC) Plan that reflect the requirements outlined in Special Permit Conditions F1 and F5 for the TWRMF liner system, and has received written approval of the plans from the MDEQ.
4. The permittee shall construct, operate, maintain, and monitor the TWRMF using sound engineering practices and in compliance with the standards prescribed in all applicable rules promulgated under Part 632 of the NREPA.
5. The permittee shall conduct a QA/QC program during the installation of the TWRMF liner systems, leachate collection and cover system, as applicable, in conformance with the Construction Quality Assurance (CQA) procedures under Michigan's Solid Waste Management Rules, R 299.4916.
6. The permittee shall calculate and record the average daily flow rate in the leak detection system on a monthly basis. Flow rate shall be calculated as gallons per acre per day. Such records shall be maintained on site, and be made available to the MDEQ upon request.
7. If the average daily flow rate in the leak detection system exceeds 25 gallons per acre per day, the permittee shall notify the OOGM Upper Peninsula District Geologist, investigate the leakage source(s), and develop a corrective action plan to address the leakage.
8. Upon approval by the MDEQ, the plan and specifications for the TWRMF and the operations plan for the TWRMF, including any MDEQ-approved modifications thereto, shall become incorporated into and enforceable under the permit issued pursuant to Part 632 of the NREPA. Final designs and construction specifications, as well as any modifications of, changes to, or deviations from the approved plans and specifications or operations plan, require approval by the MDEQ prior to construction of the TWRMF's.

9. The permittee shall submit all design certifications of liners, covers, and leachate collection systems to the MDEQ and shall not begin placement of ore, waste rock, overburden, or tailings in storage facilities until approved by the MDEQ.

G. Ore/Concentrate Transporting

1. The permittee shall assure that all vehicles and equipment leaving the contact area of the main facilities site will be required to undergo wheel wash. Wash water shall be used as facility process water, routed to the tailings discharge line, or treated in the WWTP.
2. The permittee shall maintain all access roads and interior roads by minimizing mud tracking and removing mud as needed, and by promptly repairing ruts, potholes, or washouts, as weather permits.
3. The permittee shall monitor for accidental spillage of ore, concentrate, or tailings, and shall promptly recover and clean up any spillage that occurs.
4. The permittee shall transport concentrate in covered trucks.

H. Water Management and Treatment

1. The permittee shall maintain ditches, culverts, spillways, and other water diversion or conveyance structures by cleaning sediment from ditches; cleaning debris from culverts; replacing rusted or damaged culverts; and repairing eroded areas and installing erosion control measures to remedy erosion as required under the Industrial Storm Water Permit.
2. The Contact Water Basins (CWB's) shall be constructed as designed to temporarily store contact water.
3. The permittee shall submit a full set of WWTP engineering designs to the OOGM Upper Peninsula District Geologist prior to construction. The permittee must submit such designs in a timely manner to receive written approval of the engineering designs from the MDEQ before construction of the WWTP.
4. The permittee shall operate and maintain the surface facility to segregate contact runoff from non-contact runoff.
5. The permittee shall notify the OOGM Upper Peninsula District Office prior to removing sediment from the CWB's.
6. Process pipelines shall be a double containment system having an inner carrier pipe inside the outer containment pipe.
7. Prior to operations, the permittee shall develop a harassment/hazing plan to reduce the use of the CWB's by aquatic birds, and this plan shall be implemented throughout operations.

I. Waste and Hazardous Materials Management

1. The permittee shall characterize, transport, and dispose of materials not exempt from the definition of solid waste in accordance with federal and state solid and hazardous waste regulations. These materials shall be properly stored, labeled and containerized prior to shipment and disposal or recycling.
2. Lubricants used for maintenance purposes shall be stored indoors. All storage will be in accordance with the federal Spill Prevention Control and

Countermeasure Plan (SPCC) and/or the PIPP. Used oil and grease will be stored and recycled in accordance with federal and MDEQ used oil regulations.

3. The permittee shall install secondary containment areas for chemical reagents being stored. In addition, all off-loading areas of bulk chemicals shall have a sloped and curbed pad to direct and contain spills.
4. The permittee shall dispose of the dewatered microfiltration sludge from the WWTP according to state and federal regulations.

J. Soil erosion and Sediment Control

1. The permittee shall implement SESC measures that effectively reduce off-site soil erosion and sedimentation and control dust, as described in SESC Plan.
2. The permittee shall utilize Best Management Practices in constructing, operating, and maintaining all temporary and permanent SESC measures.
3. The permittee shall implement temporary SESC measures during construction, and shall maintain temporary SESC features on a daily basis.
4. The temporary SESC measures shall incorporate the following:
   a. Materials and methods specified in the MDOT, 2003 Standard Specification for Construction (MDOT, 2003), where available, shall be used for specification of the materials to be used.
   b. Permittee's staff shall be certified as storm water operators to complete the required inspections and coordinate repairs and maintenance during construction.
   c. Marketable timber shall be removed from the site. Unmarketable timber, herbaceous plants, dead wood, stumps, and other vegetation may be chipped and stockpiled on-site for use in reclamation. Stumps that are too large to be chipped shall be stockpiled and burned on-site, pursuant to a burning permit to be obtained from the MDNR.
   d. Clearing and grubbing shall be completed as a single continuous operation to minimize disturbance.
   e. Silt fencing shall be placed downgradient before clearing and grubbing.
   f. Topsoil shall be stripped from the mine site area immediately after clearing and grubbing.
   g. Topsoil and subsoil shall be stockpiled in a previously prepared area. Stockpiles shall have maximum slopes of three to one, and shall be surrounded by additional silt fence.
   h. As soon as possible after establishment, stockpiles shall be prepared and seeded with a mixture adapted for local soil conditions as specified in the MDOT, 2003 Standard Specifications for Construction. Seed mixtures shall include temporary species such as oats or perennial rye, and perennial native species.
5. The permittee shall establish permanent SESC measures as soon as possible after grading and stockpiling has been completed, and shall maintain the permanent measures for the life of the Back Forty Project.
6. The permittee shall notify OOGM prior to removal of temporary SESC control measures.

7. The permittee shall maintain the storm water conveyance and storage basins as designed and constructed as required under the Storm Water Pollution Plan in the Industrial Storm Water Permit. The permittee shall conduct inspections promptly after precipitation or snow melt events. The permittee shall repair areas that exhibit erosion as soon as practical by filling with topsoil and seeding with the appropriate mix as specified above.
8. The permittee shall monitor sedimentation build up in water retention basins and remove sediment as necessary to maintain sufficient storage capacity.

K. Environmental and Facility Monitoring

1. The permittee shall maintain groundwater monitoring wells by marking the wells with flags to prevent damage during other maintenance; installing protector pipes; and repairing or replacing broken protector pipes, surface seals, and locks.
2. In addition to the groundwater monitoring well locations specified in the Response, Attachments 44 and 45, groundwater monitoring wells shall be constructed and added to the groundwater monitoring network prior to commencement of operations for collection of water quality samples and groundwater elevations as close as practicable to the following locations:
   a. Leachate well near northwest corner of the Flotation TWRMF.
   b. Monitoring well west of Flotation TWRMF, north of pit, east of River Road.
   c. Monitoring well west of Oxide TWRMF, north of Flotation TWRMF, east of River Road.
3. The permittee shall monitor surface water quality quarterly at locations specified in the Environmental Monitoring Plan, Figure 5-1 and Figure 63-1 of the Response, June 2016, MSG-4, MSG-5, MSG-10, and Spring Lake locations as specified in the EIA, and the unnamed tributary to Boerner Upper (45.455685, -87,806805).
4. The permittee shall submit a plan to the OOGM Upper Peninsula District Geologist to monitor surface water and aquatic biota. The permittee must receive written approval of the plan from the MDEQ before commencement of mining operations. The plan shall incorporate the following information:
   a. Analytical methods used for ambient water samples shall include the U.S. Environmental Protection Agency (USEPA) trace metals/elements methods.
   b. Aquatic Biota Sampling: To detect environmental impacts and evaluate compliance with Part 632 of the NREPA, the permittee shall continue to monitor and assess the biological communities and aquatic habitat at currently selected baseline monitoring locations and those added in K3 and at acceptable control sites. A long-term aquatic sampling plan including a description of proposed control sites, sampling methods, and a standardized monitoring schedule shall be submitted to the OOGM Upper Peninsula District Geologist for approval.
   c. The current ambient monitoring stations selected by the company should be revisited on a periodic basis over the life of the discharge. To reduce the

effects of seasonal variability, ambient monitoring should be conducted in the same season throughout the life of the facility operations.

d. Reporting of water quality results: In addition to annual summary reports for groundwater and surface water quality monitoring, a brief report shall be provided to the MDEQ within 30 days in the event that any stations with unusual outlier data points or other issues of concern are identified.
e. Measurement of flow should be reported during ambient water sampling events. Ambient water samples should not be taken from water bodies that are either at or below the 95 percent exceedance flow or stagnant as the data generated give erroneous results; such events should be reported as not applicable due to lack of flow..
f. Sediment analytical results from selected monitoring stations (both baseline monitoring and control sites) shall be compared to the Consensus-Based Probable Effect Concentrations found in MacDonald et al., 2000. (MacDonald, D.O., C.G. Ingersoll, and T.A. Berger, 2000Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. Arch. Environ. Contam Toxicol 39, 20-31).

5. The permittee shall conduct additional surface water quality monitoring and macroinvertebrate and fish community surveys (quantitative and non-wadeable) prior to operations to confirm seasonal baseline conditions for the surface water monitoring locations specified in Special Permit Condition K3. A minimum of four water quality sample results spaced over a period of one year are needed to compare with ambient water quality standards.
6. The permittee shall collect and analyze water samples as specified in the Groundwater and Surface Water – Water Quality Monitoring Program, Table 2-1, of the Environmental Monitoring Plan, including the following additional parameters, using appropriate analytical methods, target detection limits, and sampling frequencies: uranium, fluoride, nickel, hardness, radium, Volatile Organic Compounds (VOC's) and acrylamide.
7. To assess impacts of fugitive dust and other mining impacts on human health, the permittee shall monitor and assess selenium and mercury concentrations fillets of ten legal size predator fish sampled from the first impoundment downstream of the project (Grand Rapids Flowage), the White Rapids impoundment, as well as from Spring Lake (30 total fish). Additional samples should be taken every 3 years after the start of operations for a minimum of three events to evaluate temporal trends. Sampling frequency reductions can be requested after that time.
8. The permittee shall collect and analyze operations water quarterly from the mine pit, the TWRMFs, and the CWBs for the parameters listed on Table 2-1 of the Environmental Monitoring Plan and Special Permit Condition K6.
9. The permittee shall conduct regional hydrologic monitoring to evaluate local and regional stream flow and quality and local and regional groundwater elevations in accordance with the requirements of R 425.203(g) and R 425.406.
10. The permittee shall monitor the flow of water from the WWTP with a meter that reports total flow. The permittee shall keep a log of daily meter readings and

computed daily flow in U.S. gallons per day, which shall be available for inspection by the MDEQ upon request.

11. The permittee shall notify the OOGM Upper Peninsula District Geologist and shall institute an increased monitoring program or implement response activity, as described in R 425.406 of the rules promulgated under Part 632 of the NREPA and as approved by the MDEQ, at such time results indicate an actual or potential impact from mining operations.
12. The permittee shall monitor for flora, fauna, fish, and wildlife habitats, and biodiversity during mine operations as specified in the Environmental Monitoring Plan and approved Sampling and Analysis Plan (SAP).
13. The permittee shall utilize results of the fish, aquatic macroinvertebrates, and aquatic habitat surveys in conjunction with water quality monitoring results, as applicable, to identify actual or potential adverse impacts to water quality that may be caused by a release associated with a mining activity that is the responsibility of the permittee. The permittee shall notify the Upper Peninsula District Geologist, and shall institute an increased monitoring program or implement response activity as approved by the MDEQ.
14. The permittee shall conduct regular inspections of impermeable surfaces, and make repairs as necessary.
15. The permittee shall monitor the volume of water pumped from the mine pit from the mine pit with a meter that reports total flow. The permittee shall keep a log of daily meter readings and computed daily flow in U.S. gallons per day, which shall be available for inspection by the MDEQ upon request.
16. The permittee shall conduct facilities monitoring as specified in the Mine Facilities Inspection Plan and Schedule, Table 109-1 (Response, June 2016). The permittee shall maintain inspection logs at the Back Forty Project that document the results of the inspections. Inspection logs shall be preserved and made available to MDEQ upon request. Preventive or corrective maintenance actions shall be performed as soon as possible to repair defects or damaged areas.
17. Leak detection systems shall be inspected monthly, after any rainfall event that exceeds half an inch in a 24-hour period, and after the spring snowmelt and runoff period. Any flows present in a leak detection system shall be sampled and analyzed for key parameters that are indicative of the source of the flow. The permittee shall maintain an inspection log at the Back Forty Project that documents the results of the inspections. Preventive or corrective maintenance actions shall be performed as soon as possible as required.
18. The postclosure monitoring and maintenance activities for the Final Closure TWRMF leachate collection system shall continue for 50 years after approval of reclamation, or until the MDEQ determines that no significant impacts to water will occur.
19. Pit slope monitoring shall be conducted as specified in Table 22-1 of the Response, June 2016.
20. Prior to construction of the cut-off wall, the final design mix shall be determined by suitability tests to ascertain that the SCB (soil, cement, bentonite) mix will

meet the minimum hydraulic conductivity and a shear strength requirement to meet the final design criteria.

21. The permittee shall conduct geotechnical and hydrogeologic testing throughout mining operations to validate the design of the pit slope, Engineering Geology Model (EGM), and design of the cut-off wall. A report of this testing shall be included in the Annual Mining and Reclamation Report.
22. The permittee shall monitor the performance and integrity of the cut-off wall throughout operations by implementing the following as part of the geotechnical monitoring program:
    a. Install piezometers both in the bedrock and overburden to monitor the groundwater levels downgradient and upgradient of the cut-off wall, per Special Permit Condition K23, to confirm the piezometer levels are as predicted in the seepage analysis models. A series of vibration wire piezometers shall be installed at the downgradient face of the cut-off wall.
    b. Monitor seepage flow from the toe of the overburden slope daily. The quantity of any measured flow shall be compared to the predicted flow as modeled in the seepage analysis.
    c. Monitor ground movements and vibration by installing inclinometers downgradient of the cut-off wall to measure lateral movements and survey monuments or settlement gauges on top of the cut-off wall for monitoring vertical movements of the cut-off wall.
    d. Install accelerometers in the cut-off wall to measure ground accelerations induced by blasting.
    e. Perform a minimum of monthly inspections of the conditions at the ground and slope surface downgradient of the cut-off wall.
    f. If seepage flow exceeds 200 gpm for 5 consecutive days, the permittee shall notify the OOGM Upper Peninsula District Geologis as soon as practicable, and conduct a review of all cut-off wall monitoring data to determine if the cut-off wall is ineffective for its intended purpose, and submit a report of findings to the OOGM Upper Peninsula District Geologis within 30 days of notification.
    g. Results of monitoring of the cut-off wall shall be included in the Annual Mining and Reclamation Report.
23. Prior to mining operations, the permittee shall submit final plans for location and design of piezometers to be installed to monitor the performance of the cut-off wall for review and approval.
24. If the results of monitoring as required by Special Permit Condition K22 indicate that the cut-off wall is ineffective for its intended purpose, the following measures shall commence immediately:
    a. Implement measures, as necessary, to collect and divert the seepage.
    b. Determine the locations of leaks based on piezometer and flow monitoring results.
    c. Commence a site investigation and testing program to assess the integrity of the cut-off wall starting with the suspected location of leak(s), including coring of the cut-off wall for examination and laboratory testing, and inspection of the

borehole wall. If necessary, downhole permeability tests may be carried out in the bedrock to further assess their hydraulic conductivities.

d. Submit a report of the investigation results and a plan for remedial design and construction to the OOGM Upper Peninsula District Geologis.
e. Carry out remedial measures as approved by the MDEQ.

25. Postclosure environmental monitoring of groundwater and surface water shall continue to be conducted quarterly until a request to modify the postclosure monitoring plan is approved by the MDEQ. Postclosure monitoring of flora, fauna, fish, and wildlife habitat shall continue to be conducted until a request to modify the postclosure monitoring plan is approved by the MDEQ.
26. The permittee shall install a well nest within WL40 to monitor for impacts that may occur due to mine dewatering. If the groundwater levels in WL40 and/or other groundwater monitoring locations indicate that there is potential for impact to occur to WL40, the permittee shall submit a plan to MDEQ to mitigate that potential impact.

L. Contingencies

1. The permittee shall maintain sufficient reserve electrical power to keep all necessary pumps and treatment systems operational in the event of a power malfunction.
2. The permittee shall provide a fire suppression system for fire protection during construction, operations, and decommission.
3. The permittee shall implement contingency measures to mitigate a fuel spill as specified in the SPCC and/or PIPP. The permittee shall perform fuel tank integrity testing at regular frequencies to verify that the storage tanks are not leaking.
4. In the event of a truck accident resulting in the spilling of concentrate, the permittee shall notify MDEQ, as well as other agencies as required by state and federal law, and implement an approved cleanup and remediation plan.
5. The permittee shall assure that operators are trained to respond to potential releases of fuel from leaking hoses or valves, mobile storage tank failure, mishandling of fuels, or related accidents. The permittee shall provide adequate on-site spill response equipment.
6. Absorptive materials may be used initially to contain a potential fuel spill. After the initial response, soil impacted with residual fuel shall be addressed. Remedial efforts shall include the removal of impacted soil to preclude migration of fuel to groundwater or surface water. The project's SPCC and/or PIPP plan shall address fueling operations, fuel spill prevention measures, inspections, training, security, spill reporting, and equipment needs. All responses to a fuel spill, both large and small, shall follow the guidelines dictated by the spill response plan. The tanks shall be inspected regularly, and records of spills shall be kept and reported to the MDEQ and other agencies as required.
7. In the event of a fuel tank failure, the permittee shall pump fuel released into the secondary containment into portable tanks, and shall take such additional remedial action as may be required by the MDEQ.

8. The permittee shall provide for required safety equipment, personnel training, and standard operating procedures to respond to potential surface fires.
9. The permittee shall utilize appropriate measures for emergency response in accordance with Mine Safety and Health Administration (MSHA) requirements.
10. The permittee shall coordinate evacuation of the general public, if necessary, in conjunction with emergency response agencies.
11. The permittee shall provide and maintain necessary emergency equipment.
12. Fire extinguishers shall be located at appropriate locations throughout the facility, in accordance with MSHA requirements. Other emergency response equipment shall be located at appropriate and convenient locations for easy access for response personnel.
13. As part of the contingency plan, the permittee shall maintain a current list of the following emergency telephone numbers as required by Rule R 425.205(1)(c):
    a. Representatives of the permittee.
    b. The emergency management coordinator.
    c. Local ambulance services.
    d. Local hospitals.
    e. Local fire and police departments.
    f. The District Office of the MDEQ.
    g. The MDEQ Pollution Emergency Alerting System.
    h. Federal regulatory agencies as appropriate.
    i. The MDNR.
    j. The Menominee County Health Department.
    k. The Lake Township Supervisor.
14. The permittee shall provide appropriate and adequate training programs on emergency response procedures for employees responsible for responding to emergencies.
15. At least once each year, the permittee shall conduct a mock field exercise of the Contingency Plan. Test situations shall consist of emergencies that could be encountered at the mill operation, such as a release of a hazardous substance, fire, or a natural disaster. The permittee shall evaluate the response exercise after completion to determine the effectiveness of the Contingency Plan. The permittee shall involve local emergency response officials as appropriate. The permittee shall implement any changes or improvements found to be necessary, and incorporate them into a revision of the facility Contingency Plan.
16. The permittee shall notify the MDEQ as soon as practical after identifying a leak in the tailings transport system that results in a tailings slurry spill that is not contained by the transport system. An approved corrective action plan shall be implemented by the permittee to include cleanup and any necessary remediation.
17. If mining operations are suspended at the Back Forty Project for a continuous period exceeding 90 days, any ore stored within the Ore Blending Area (OBA) shall be transferred to the pit.
18. If mining operations are suspended, or are expected to be suspended, for a continuous period exceeding 90 days, any reactive tailings in the TWRMF's shall be covered as soon as practicable to limit oxidation.

19. If determined to be necessary through the blast monitoring program, seismic monitors shall be positioned near structures critical to facility operations.
20. The permittee shall model for toxicity as it relates to concentrations of Total Dissolved Solids (TDS) in the effluent, and plan for controls to meet NPDES discharge standards.
21. The permittee shall grout geologic structures encountered in the pit that are determined to have the potential to have greater impact to groundwater and surface water levels than predicted in the EIA.

M. Groundwater and Surface Water Sampling Procedures

1. Prior to operations, the permittee shall submit and obtain approval for a finalized SAP that includes the details specific to the project, in accordance with Part 632 rules and conditions of this permit, and as outlined in the Preliminary Quality Assurance Project Plan. The plan shall include, but not be limited to, details for the following:
   a. Spreadsheet containing sampling location information in decimal degrees, water body name and description, date sampled, resultant water quality parameters, and biological data results. Multiple spreadsheets can be used but all should be easily accessed electronically and biological data should be easily cross-referenced to water quality parameters collected at the same site.
   b. Maps including locations associated with paragraph a. as well as project boundary.
   c. Surface water sampling procedures including, but not limited to, frequency of analysis; and example of spreadsheet described in paragraph a.
   d. Macroinvertebrates, fish, and additional biological sampling plans and procedures.
   e. Groundwater sampling procedures including well purging procedures.
   f. Procedures to prevent cross contamination of samples.
   g. QA/QC program including the use of field blanks and duplicates.
   h. Procedures for the collection of groundwater and surface water field data.
   i. Sample preservation, documentation and chain-of-custody procedures.
   j. Data validation procedures.
   k. Well installation development and abandonment procedures.
   l. List of analytes, detection limits, and quantification limits for water quality monitoring.
   m. Analytical methods and holding times.
   n. Calibration procedures
   o. Preventative maintenance of equipment/instruments.
   p. Documentation and records retention.
   q. Methods for evaluating and presenting water quality data, including statistical methods.
   r. Plan for relocation of native freshwater mussels.
   s. Plan for relocation of threatened/endangered and special concern species if they are encountered.

2. The collection of groundwater samples, water samples from the TWRMF and mine pit, and surface water samples shall be completed in accordance with the approved Back Forty Project SAP.
3. The permittee shall statistically assess groundwater, surface water quality data, and quantitative biological data during operations for distributional changes that may result from mining activities. Statistical methods will include testing for trends in water chemistry, and comparing constituent concentration levels to those observed in background or upgradient locations. Appropriate parametric or nonparametric statistical methods shall be utilized in consideration of the observed data characteristics, i.e., the distributional form of the data and the amount of data points below the detection level. In addition, sources of variation in the data unrelated to site activities, such as seasonality, shall be statistically estimated and controlled. Relevant documents containing guidance for selecting appropriate statistical tests are:
   a. Department of Environmental Quality, 2002. Sampling Strategies and Statistics Training Materials for Part 201 Cleanup Criteria.
   b. Gilbert, R. O., 1987. Statistical Methods for Environmental Pollution Monitoring, Van Nostrand Reinhold, New York.
   c. USEPA, 2000. Practical Methods for Data Analysis–EPA QA/G-9, EPA/600/R-96/084.
4. USEPA, 1992. Statistical Analysis for Groundwater Monitoring Data at RCRA Facilities – Addendum to Interim Final Guidance, PB89-151047.

   The permittee shall provide a summary of monitoring data and analyses completed in the annual mining and reclamation report. The permittee shall maintain all related monitoring data in a database including well borehole logs and construction records.

N. Financial Assurance

1. The financial assurance required shall apply to all mining and reclamation operations subject to the mining permit and shall be sufficient to cover the cost to administer, and to hire a third party to implement, reclamation under the mining, reclamation, and environmental protection plan as well as necessary environmental protection measures, including remediation of any contamination of the air, surface water, or groundwater that is in violation of this mining permit. The total financial assurance required for the Back Forty Project as of the date of this permit is $28,600,000 prior to construction; $118,500,000 prior to commencement of operations.
2. The permittee shall periodically update the amount of financial assurance in accordance with the requirements of Rule R 425.301.

O. Reclamation

1. The permittee shall conduct reclamation activities at the Back Forty Project in accordance with the mining, reclamation, and environmental protection plan submitted as part of the Mine Permit Application.

2. Utilizing the data collected in Special Permit E12, prior to commencement of Phase 3 of Reclamation, the permittee shall submit to the department a final design plan for backfilling of the pit, including buffering amendment and procedures for the backfilling process such that leachate will not be released into the environment during the backfill process, for review and approval.
3. The backfill waste rock shall be placed within the mine pit so that it is not in direct contact with the weathered bedrock zone on the pit wall.
4. Unless the MDEQ grants an extension, the permittee shall begin final reclamation of a mining area within three years of the date of cessation of mining operations at the Back Forty Project and shall complete reclamation within the time set forth in the mining, reclamation, and environmental protection plan submitted as part of the Mine Permit Application.
5. Liner material shall not be disposed of in the backfilled pit without prior approval of the MDEQ.
6. The permittee shall reclaim the Back Forty Project site at the conclusion of mining and ore processing to establish a self-sustaining ecosystem in conformance to R 425.204 and R 425.407. The final land use of the site will be compatible with existing uses on adjacent properties.
7. The permittee shall, to the extent feasible, conduct reclamation activities concurrently with the mining operation, and in any event shall initiate reclamation activities at the earliest possible time after cessation of mining activities in any portion of the mining area. Reclamation activities shall commence during initial construction activities and shall continue through facility closure and the postclosure care period.
8. Buildings shall be demolished after salvageable materials have been removed unless the permittee enters into an agreement with another party in which a property end use is established that includes beneficial use of any building(s). Concrete foundations and floor slabs shall be removed for all buildings that are demolished. Demolition debris shall be removed from the site and disposed at an off-site disposal facility approved by the MDEQ. All regulated materials, if any, shall be disposed in a manner consistent with state and federal regulations.
9. After removal of all debris the building areas shall be graded to eliminate ponding and to promote surface water drainage.
10. Dikes constructed for the temporary control or diversion of surface water run-on or runoff shall be abandoned where possible and regraded to conform to the reclamation grading plan.
11. A multi-layer composite cover system shall be constructed over the disposed tailings in the Final Closure TWRMF with a grade that will provide adequate surface water drainage as specified in the Treatment and Containment Plan for Tailings and Waste Rock.
12. Leachate shall be pumped and treated by the WWTP or other approved system before being released into the environment from the Final Closure TWRMF until such time the volume of leachate generated in the Final Closure TWRMF is determined to reach a rate that can be contained within the TWRMF indefinitely without causing adverse impacts to surface water or groundwater.

13. The water treatment system shall be removed subsequent to MDEQ approval when it is no longer needed to treat water from the Final Closure TWRMF.
14. Revegetation shall include species indigenous to the area, promoting a self-sustaining plant community. Native grass planting shall follow the procedures outlined in the Natural Resources Construction Service, Native Grass Planting Conservation Reserve Enhancement Program, CREP-CP2. Fertilizer shall be applied at an appropriate rate based on topsoil nutrient testing.
15. Erosion control methods described for construction shall be utilized during reclamation. During reclamation erosion control practices shall include:
    a. Applying mulch to all ground cover areas.
    b. Installing silt fence.
    c. Installing erosion control fabric on slopes steeper than eight percent.
    d. Installing straw bale check dams or rock filled gabions in drainage ditches.
    e. Using of riprap in ditches to reduce water velocity.
16. During reclamation, temporary silt control basins shall be constructed to contain surface water runoff. These structures shall be strategically placed during final site grading to better control surface water runoff during site reclamation activities. Exposed areas being reclaimed will be kept wet as necessary to control fugitive dust. After completion of site grading the temporary basins shall be filled in and restored to the surrounding topography.
17. At such time as monitor wells are to be abandoned, the permittee shall abandon the wells in accordance with MDEQ requirements.